Sleep Medicine after the pandemic: the new normal

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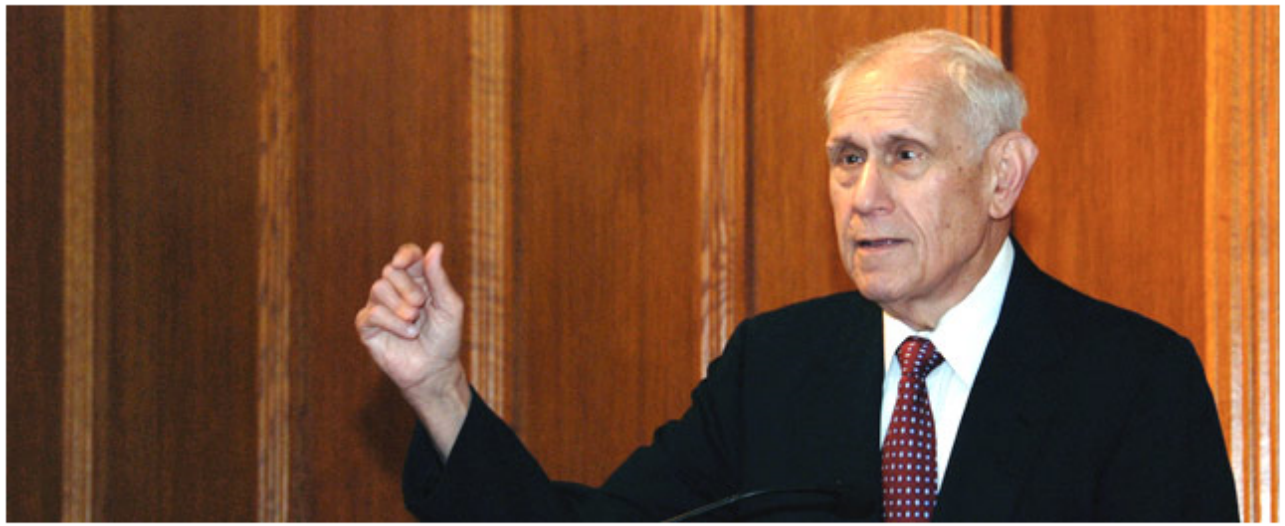
Introduction to Ancient Greek History



Course Number

CLCV 205

About Professor Donald Kagan

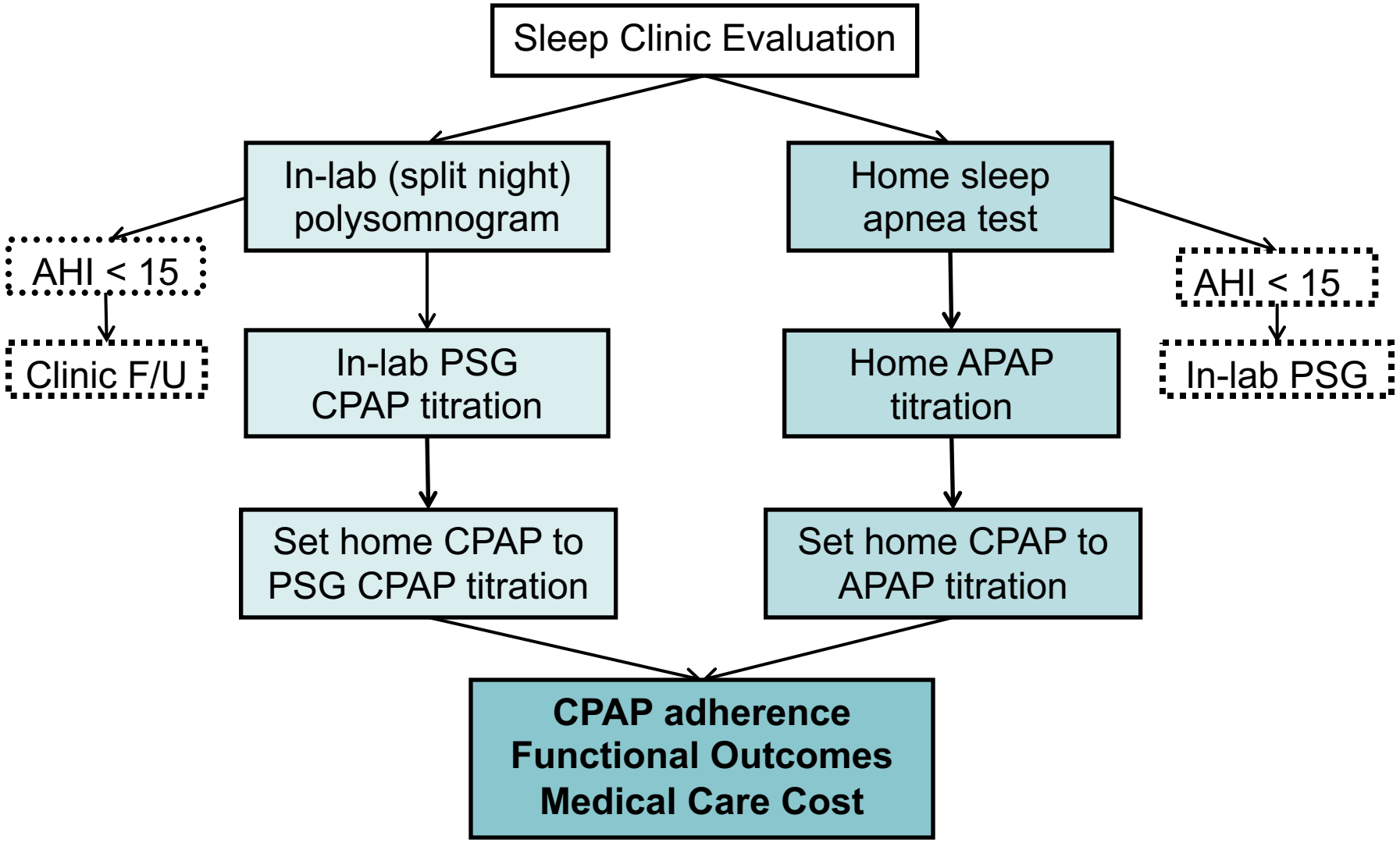
Donald Kagan is Sterling Professor of Classics and History at Yale University. A former dean of Yale College, he received his Ph.D. in 1958 from The Ohio State University. His publications include *The Archidamian War*, *The Peace of Nicias and the Sicilian Expedition*, *Pericles and the Birth of the Athenian Empire*, *On the Origins of War and the Preservation of Peace*, and *The Peloponnesian War*.

Outline

> The secret of change is to focus all of your energy, not on fighting the old, but on building the new.
> - Socrates

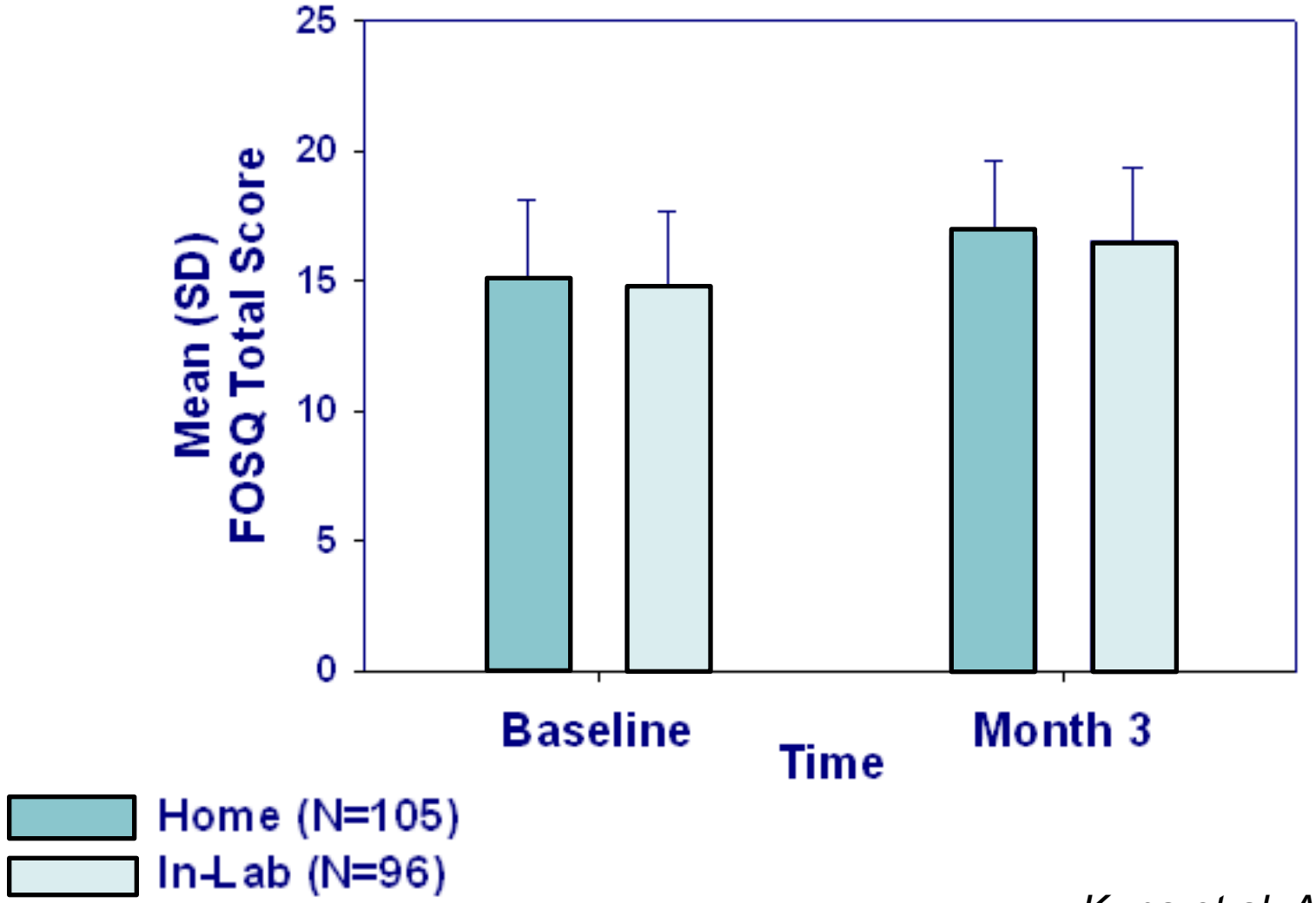
- Pre-pandemic VA ambulatory OSA clinical management pathway
- Accelerated evolution to telemedicine pathway during pandemic
- Expanding HSAT to patients with co-morbid conditions
- REVAMP – a VA web-based platform to improve access to care and improve PAP adherence
- The VA Office of Rural Health TeleSleep program – creating a national sleep network

Veterans Sleep Apnea Treatment Trial



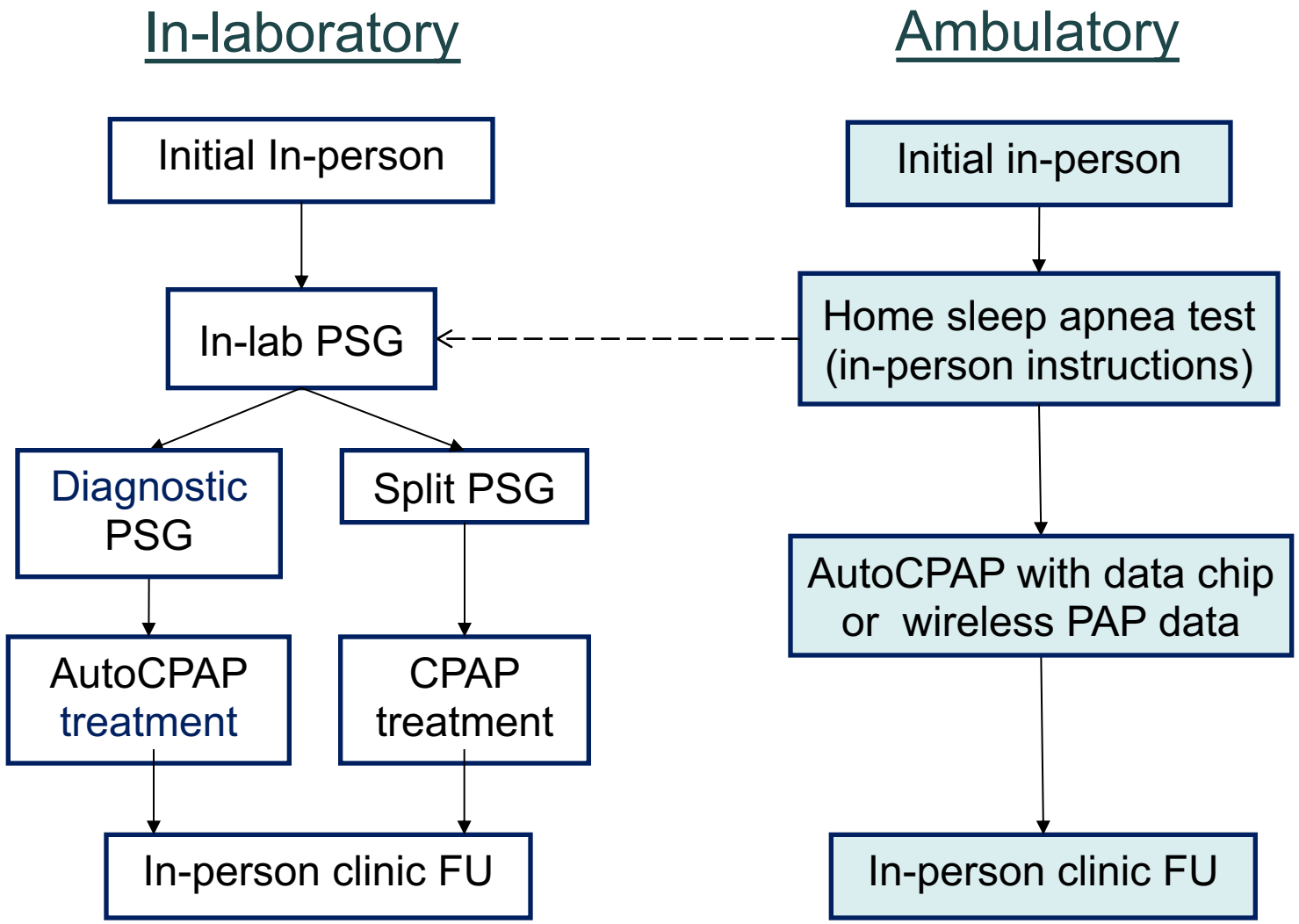
Kuna et al. AJRCCM 183:1238-44, 2011.

Functional outcomes with home sleep apnea testing are not clinically inferior to those with in-lab testing

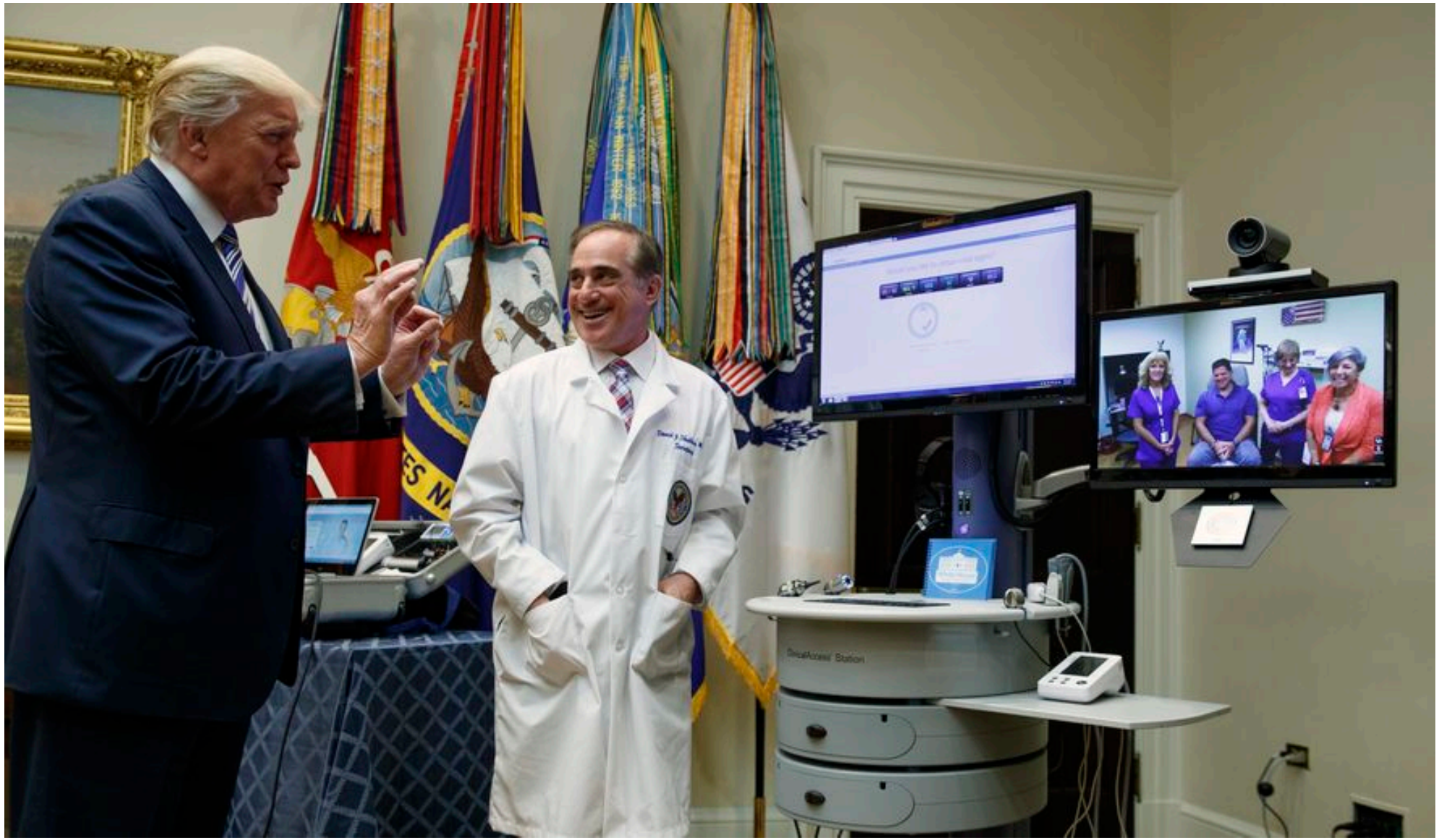


Kuna et al. AJRCCM 183:1238-44, 2011.

Clinical pathways to diagnose and manage adults with OSA



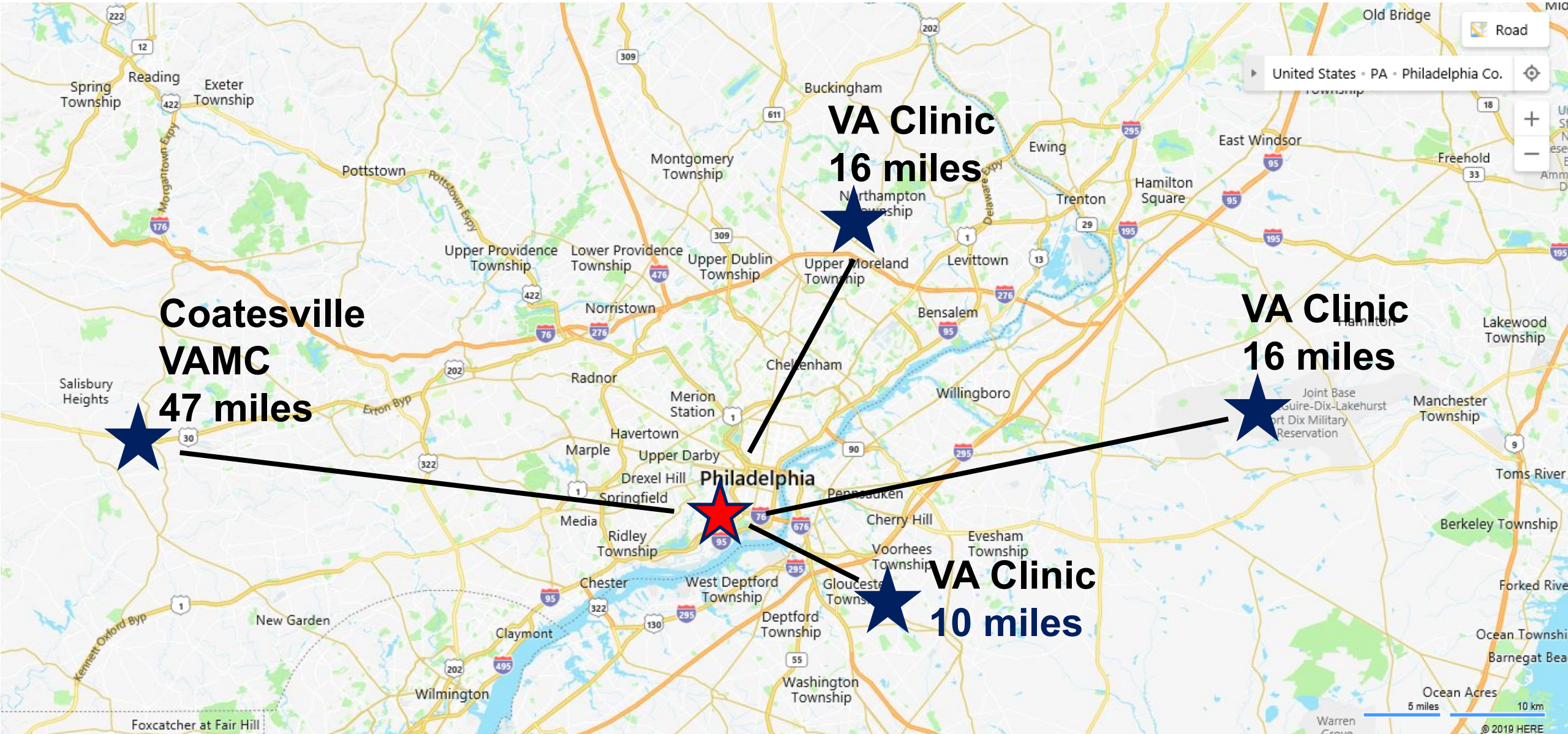
Telehealth is a priority of the Veterans Administration



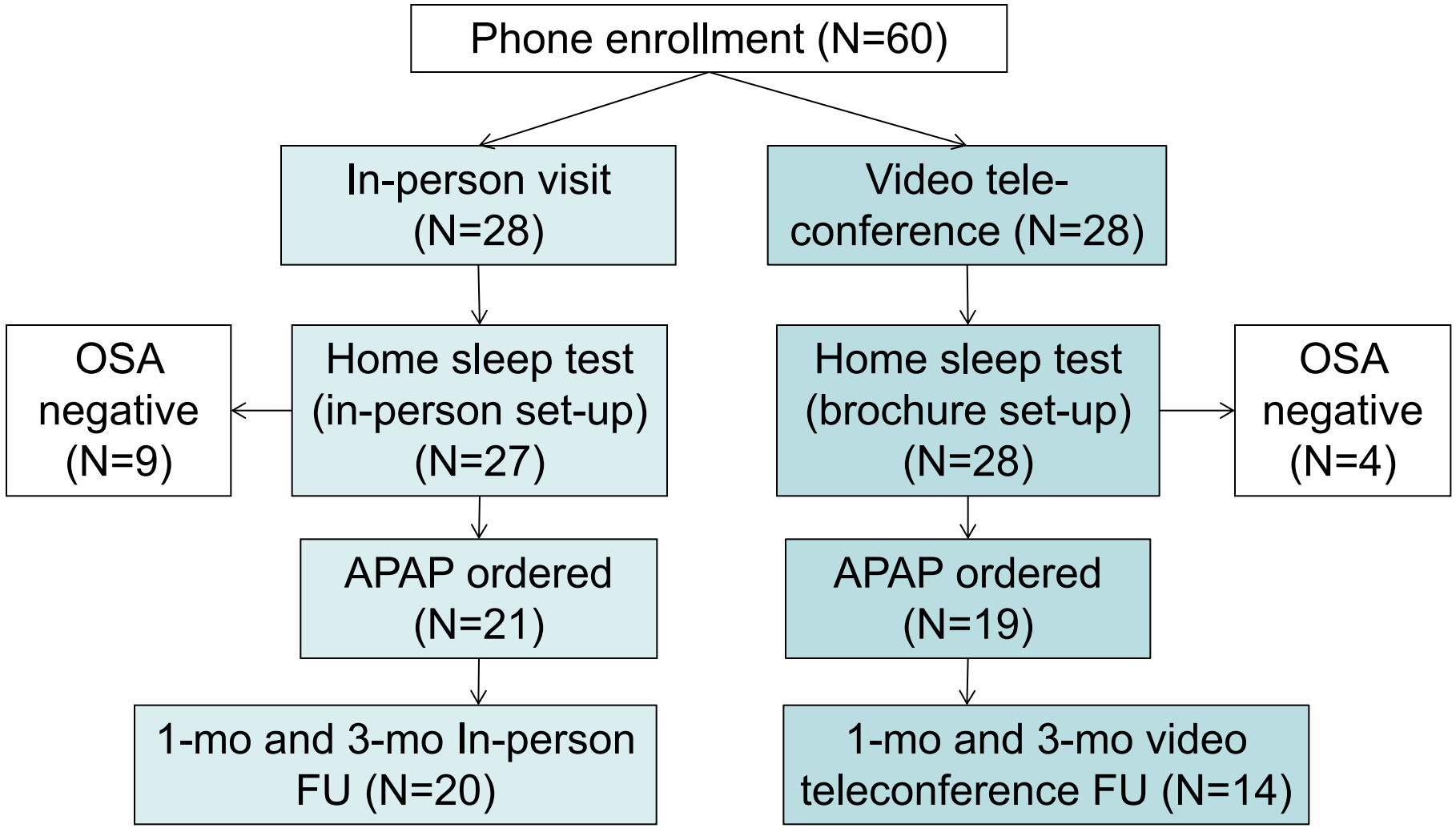
Clinical video teleconferencing (CVT)

Clinical Video Teleconferencing
Exchanging health services live via videoconference between medical facilities

Pre-pandemic hub-spoke network at CMC VAMC



Patient satisfaction with telemedicine clinical management



Fields et al. Sleep 39(3): 501-509, 2016.

Video teleconference vs in-person OSA care: CPAP adherence and satisfaction

Table 5—Adherence to automatically-adjusting positive airway pressure 3 mo after its initiation.

Variable	In-Person Care (n = 20)	Telemedicine Care (n = 14)	P
% days with device usage	54 ± 8	65 ± 8	0.493
% days ≥ 4 h	39 ± 8	47 ± 9	0.493
Use, min (all days)	175.6 ± 36.8	220.8 ± 37.5	0.301
Use, min (days used)	268.9 ± 32.1	305.7 ± 29.9	0.426

Values presented as mean ± standard error.

Variable	In-Person Care (n=19)	Telemedicine Care (n=15)	P Value
Working Alliance Index (WAI)	1.70 ± 1.50	5.93 ± 1.77	0.074
Client Satisfaction (CSQ-8)	0.013 ± 0.48	-0.31 ± 0.57	0.665

Fields B et al. Sleep 39(3): 501-509, 2016.

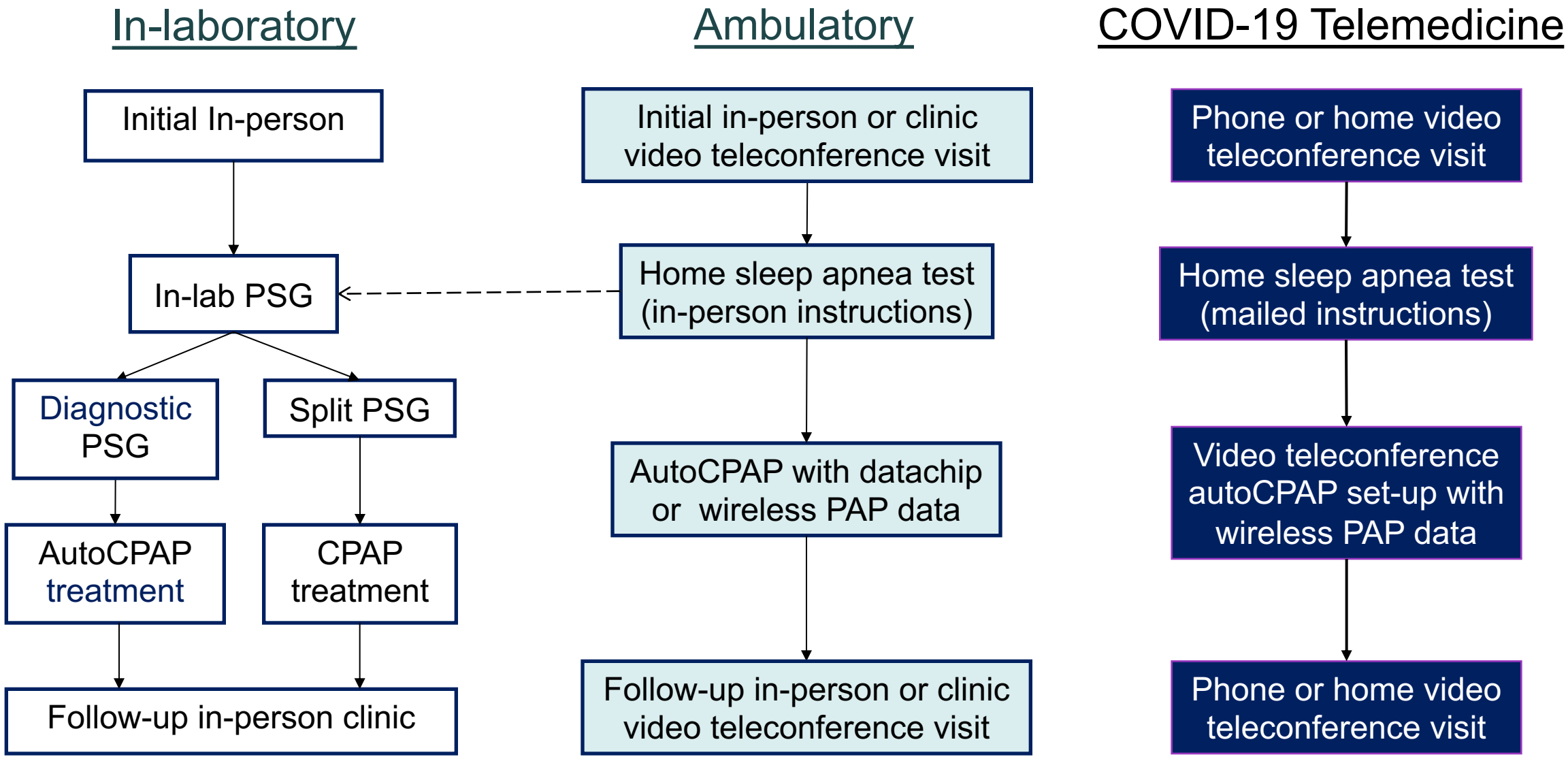
Time to Leap Into Sleep Telemedicine?

VA Video Connect teleconferencing (VVC)

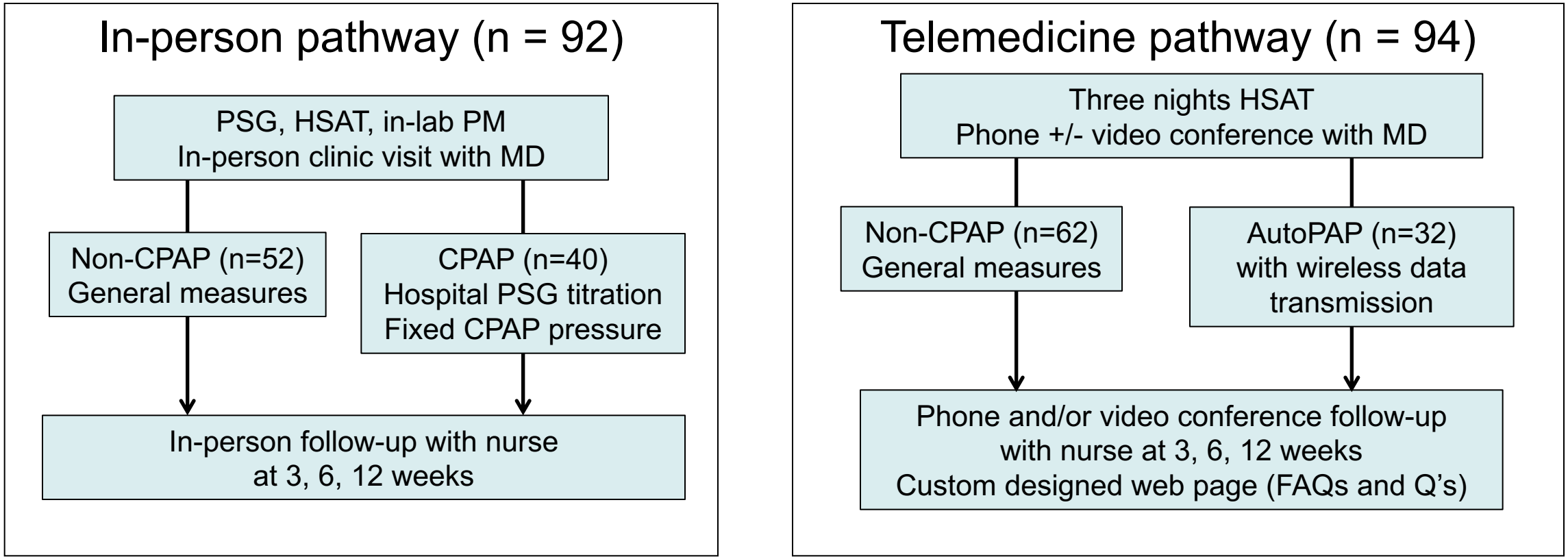
Video teleconferencing to patient at home

Exchanging health services live via videoconference to patient's home computer and mobile devices

The COVID-19 telemedicine pathway



Comprehensive management of OSA by telemedicine



3-month assessment : All patients: Sleep, quality of life and satisfaction questionnaires;
Participants on CPAP: symptoms, CPAP side effects and adherence

Lugo VM et al. PLoS ONE 2019;14:e0224069.

Functional outcomes of telemedicine versus in-person pathway

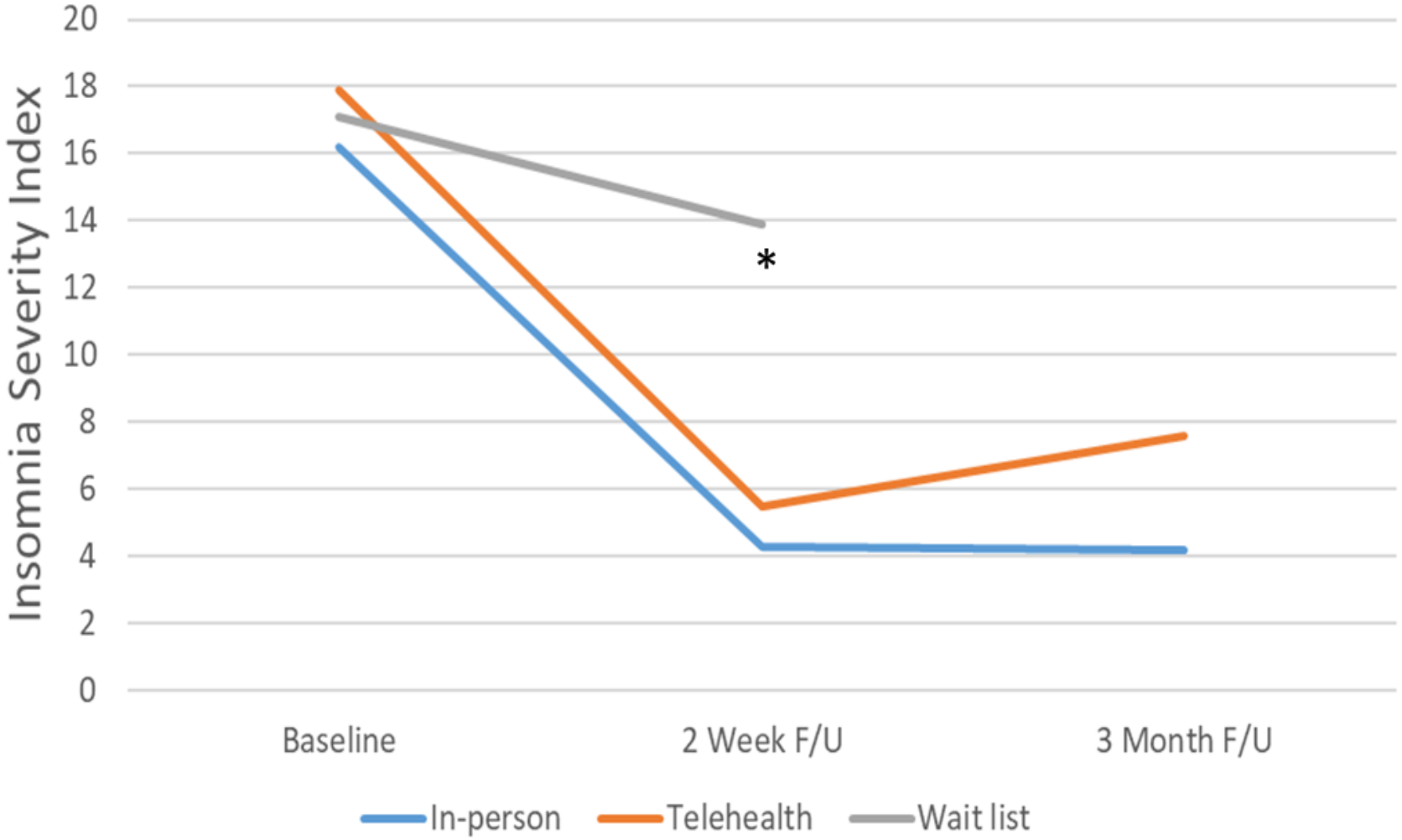
Mean CPAP adherence:

- Telemedicine pathway 5.68 ± 1.38 hours/day
- In-person pathway 5.63 ± 1.64 hours/day

	LS mean difference (telemedicine minus in-person)	**95% CI for difference**		
		Lower limit	Upper limit	P value
Quebec Sleep Q	-1.14	-2.34	0.11	0.074
QSQ Social	**-0.48**	-0.84	-0.12	**0.010**
EuroQol-SD	0.04	-0.004	0.09	0.074
EuroQol- VAS	**5.58**	-0.11	11.04	**0.046**
Epworth SS	0.63	-0.62	1.87	0.324

Lugo VM et al. PLoS ONE 2019; 14:e0224069.

CBT-I delivered by video teleconferencing is not clinically inferior to in-person delivery



Gehrman P et al. J Clin Psychiatry (in press).

Pros and cons of telemedicine management

Advantages

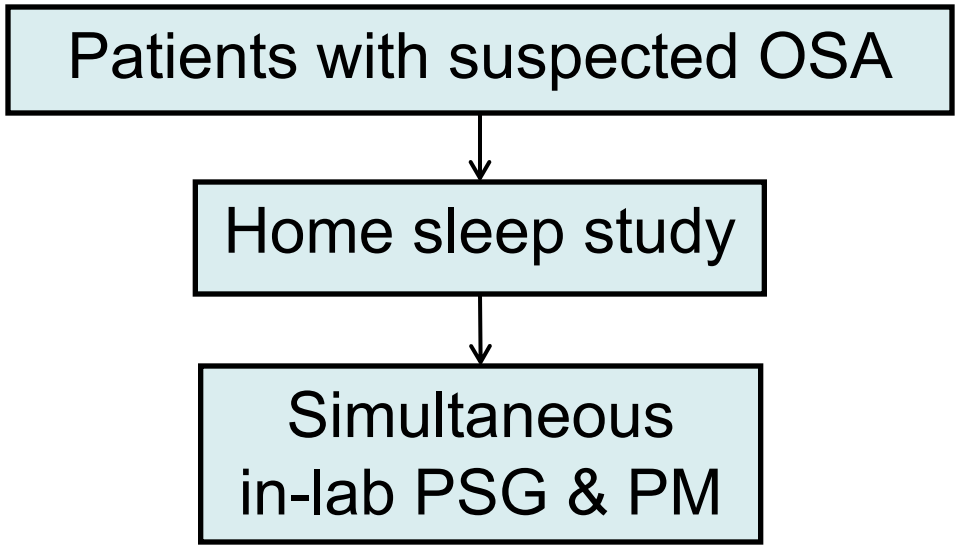
- Convenience
  - ✓ reduces patient time off from work
  - ✓ reduces expense of travel
  - ✓ allows staff to telework
- Increased access to care
  - ✓ decrease in no-shows
  - ✓ care to disabled and rural patients
- Decreased cost

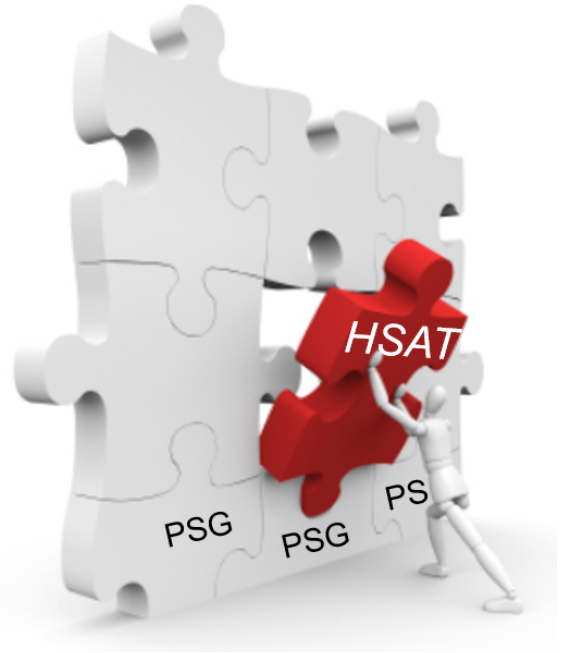
Disadvantages

- Limits ability to form an interpersonal relationship with patient
- Inability to perform physical exam
- Compromises training of staff and fellows – loss of the 360 experience
- Patients' casual approach to remote care and tendency to receive care 'on-the-fly'

Using HSAT to diagnose sleep apnea in adults with COPD and CHF

Challenges to validating home sleep testing
- Different recording devices
- Different nights
- Different environments





Validation of HSAT in adults with COPD (n = 90)

Age (yr)	66.5 ± 7.8
Males, N (%)	80 (89)
BMI (kg/m^2)	27.5 ± 5.8
AHI 4% (PSG)	21.2 ± 26.2
FEV_1/FVC	**53.5 ± 12.4**
FEV_1	**1.57 ± 0.65**
FEV_1 (% predicted)	**54.0 ± 18.4**
FVC (L)	2.90 ± 0.91
FVC (% predicted)	77.8 ± 18.4

Chang Y et al. J Clin Sleep Med 2019;15(4):587–596.

Validation of HSAT in adults with COPD (n = 90)

Table 2—Values for different cutoffs of manually edited AHI 4% measured by Nox-T3$_{home}$ and Nox-T3$_{lab}$ versus PSG.

	AHI 4% (events/h)	Prevalence	Sensitivity	Exact 95% CI		Specificity	Exact 95% CI		PPV	NPV
				LB	UB		LB	UB		
HSAT vs PSG	≥ 5	.64	.95	.85	.99	.78	.60	.91	.88	.89
	≥ 10	.50	.86	.72	.95	.91	.78	.97	.90	.87
	≥ 15	.45	.74	.58	.87	.98	.89	1.00	.97	.82
	≥ 30	.28	.58	.37	.78	.98	.91	1.00	.93	.86
PM in-lab vs PSG	≥ 5	.63	.96	.87	1.00	.84	.67	.95	.91	.93
	≥ 10	.49	.95	.84	.99	.98	.88	1.00	.98	.96
	≥ 15	.43	.95	.82	.99	.98	.89	1.00	.97	.96
	≥ 30	.28	.96	.79	1.00	.98	.91	1.00	.96	.98

Prevalence, sensitivity, specificity, PPV, NPV for different cutoffs of manually edited AHI 4% from Nox-T3$_{home}$ and Nox-T3$_{lab}$ versus the PSG. Scoring of hypopneas on all three types of sleep test required an associated oxygen desaturation event ≥ 4%. AHI = apnea-hypopnea index, CI = confidence interval, LB = lower bound, Nox-T3$_{home}$ = home testing using the Nox-T3 device, Nox-T3$_{lab}$ = in-laboratory portable monitor recording using the Nox-T3 device, NPV = negative predictive value, PPV = positive predictive value, PSG = polysomnography, UB = upper bound.

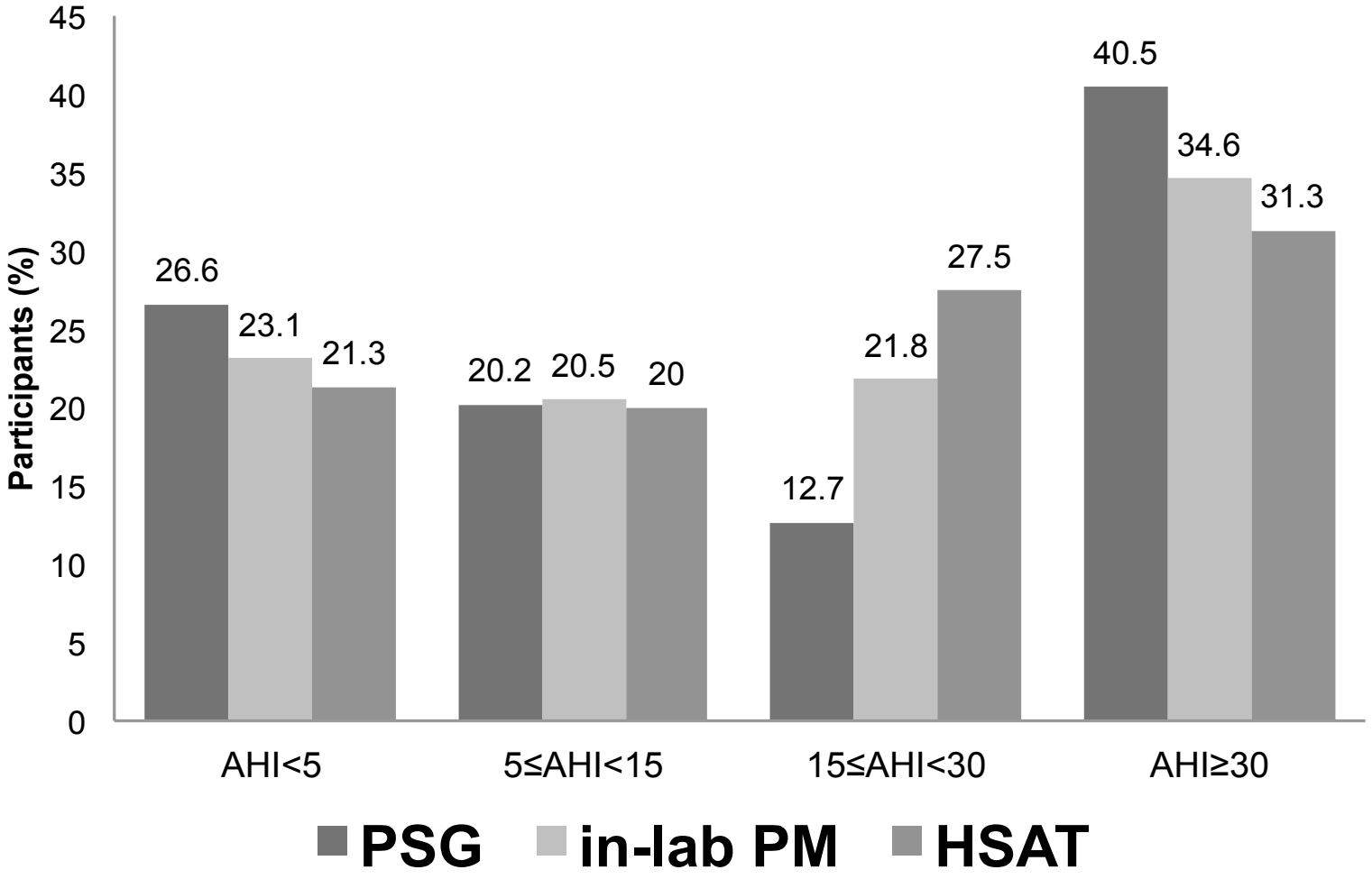
Chang Y et al. J Clin Sleep Med 2019;15(4):587–596.

HSAT in adults with chronic heart failure (n = 84)

Age, years	58.7 ± 16.3
Sex, n (%)	
Male	73 (86.9)
BMI, kg/m^2	29.4 ± 13.0
AHI 4% (PSG), events/hr	23.8 ± 21.3
LVEF (%)	**40.3 ± 11.5**
LVEF < 50% (% of participants)	**71 (84.5)**
COPD, N (%)	11 (13.1)

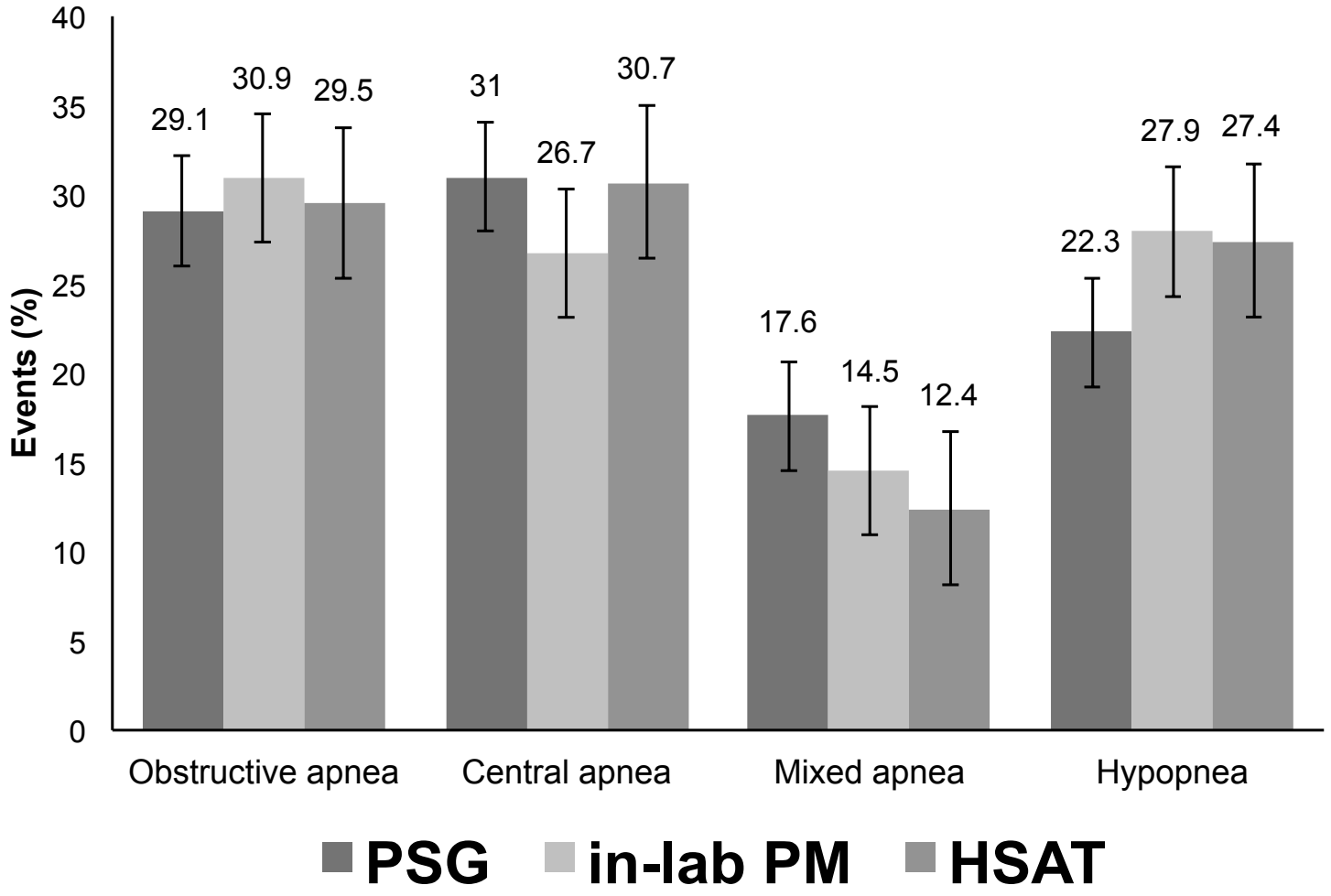
Li S et al. J Clin Sleep Med 2021.

AHI on HSAT and on simultaneous in-lab portable monitor and PSG in adults with chronic heart failure



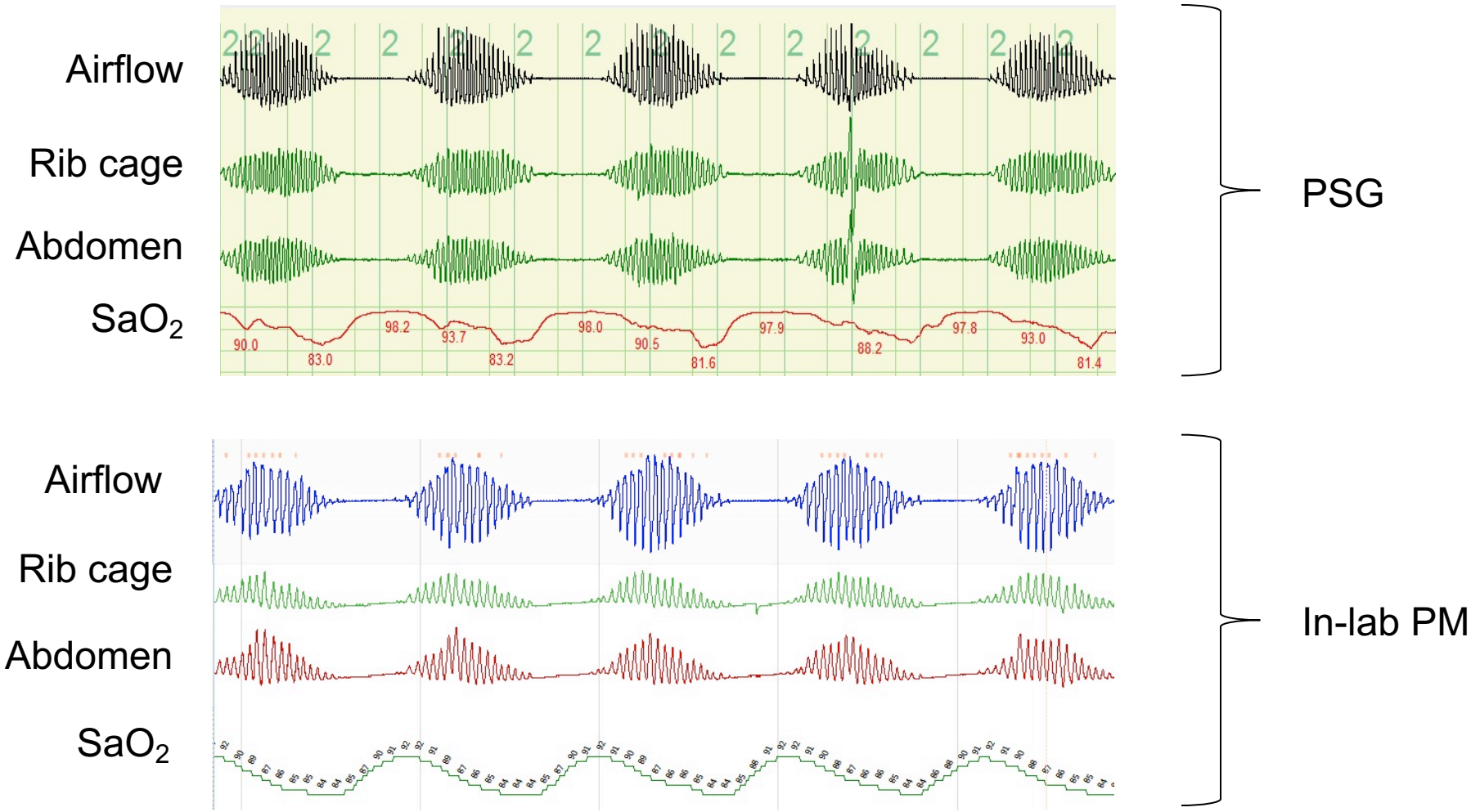
Li S et al. J Clin Sleep Med 2021.

Events on HSAT vs simultaneous in-lab portable monitor and PSG in adults with chronic heart failure



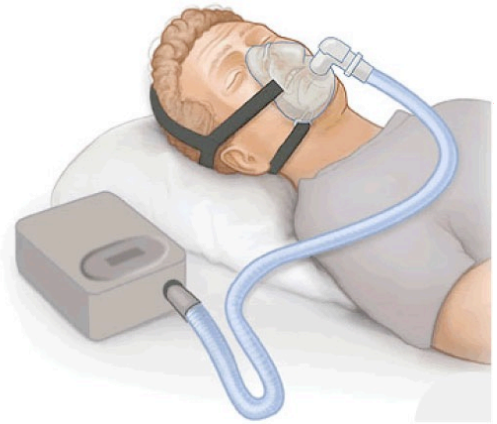
Li S et al. J Clin Sleep Med 2021.

Cheyne-Stokes respiratory pattern during simultaneous in-lab portable monitor and PSG recordings



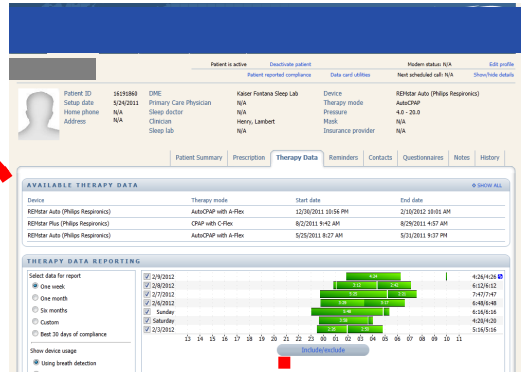
Li S et al. J Clin Sleep Med 2021.

Remotely monitoring PAP results – Store & Forward



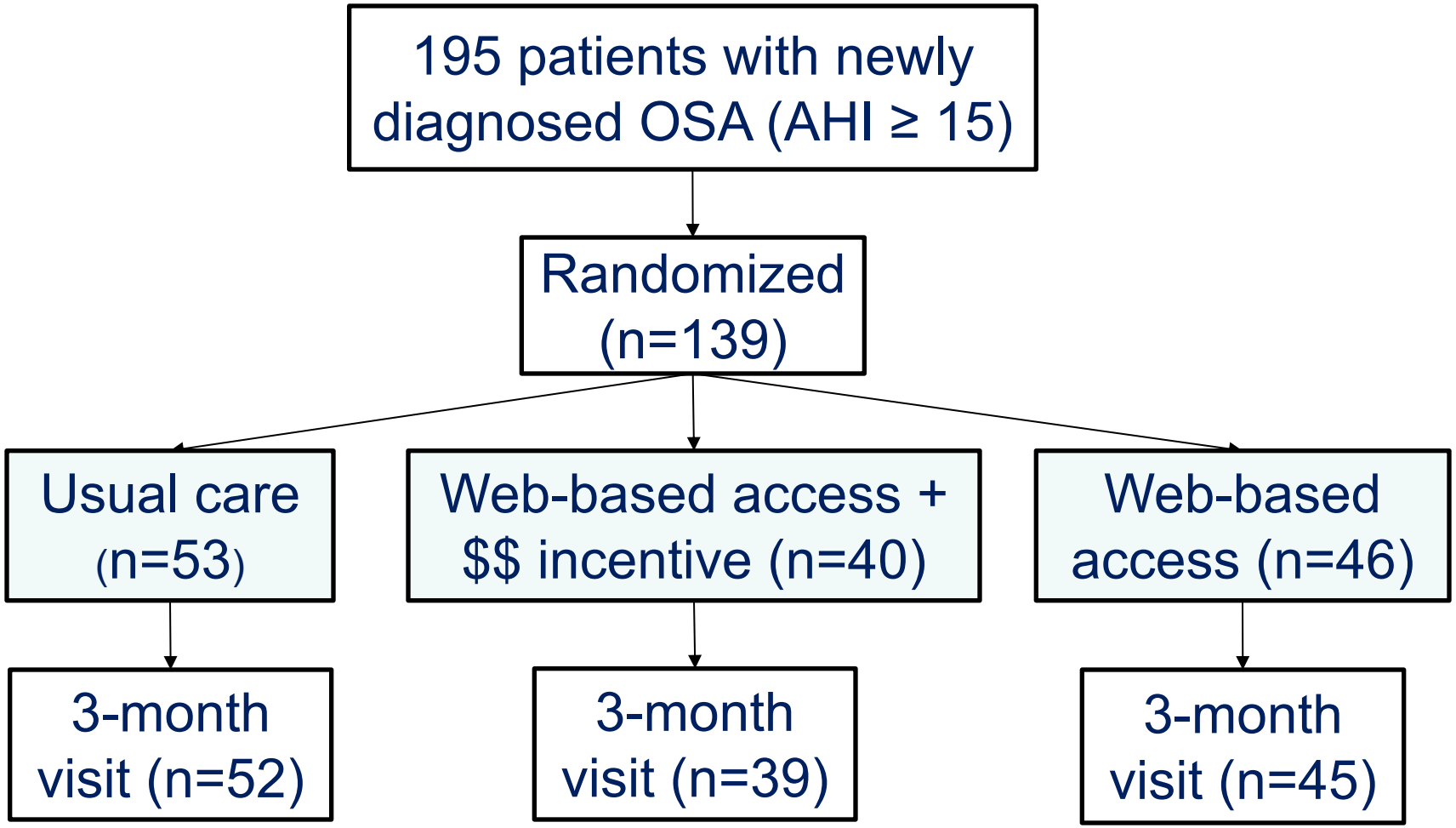
Clinician

Manufacturer's website



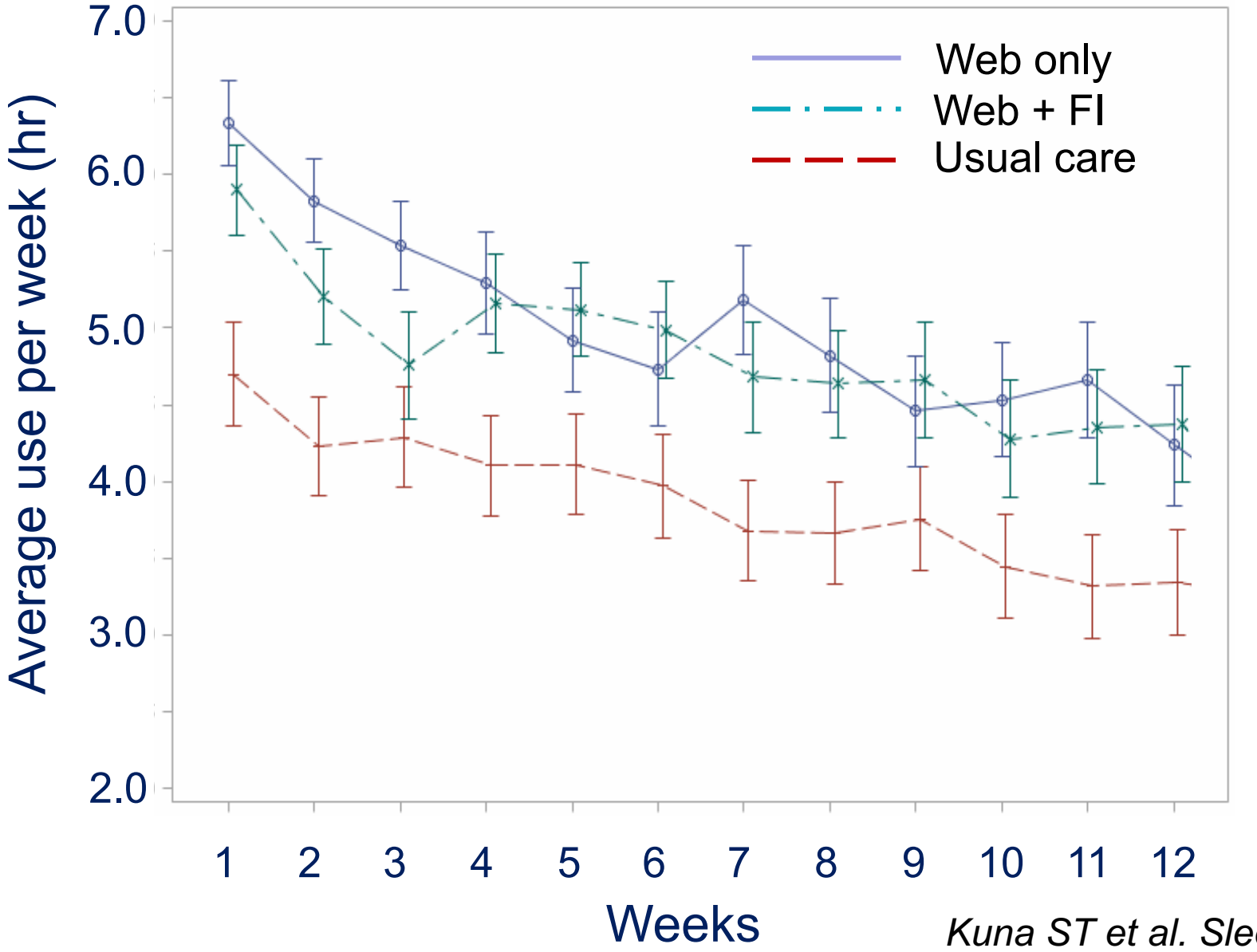
Patient-facing website

Does giving patients access to their CPAP results improve adherence?



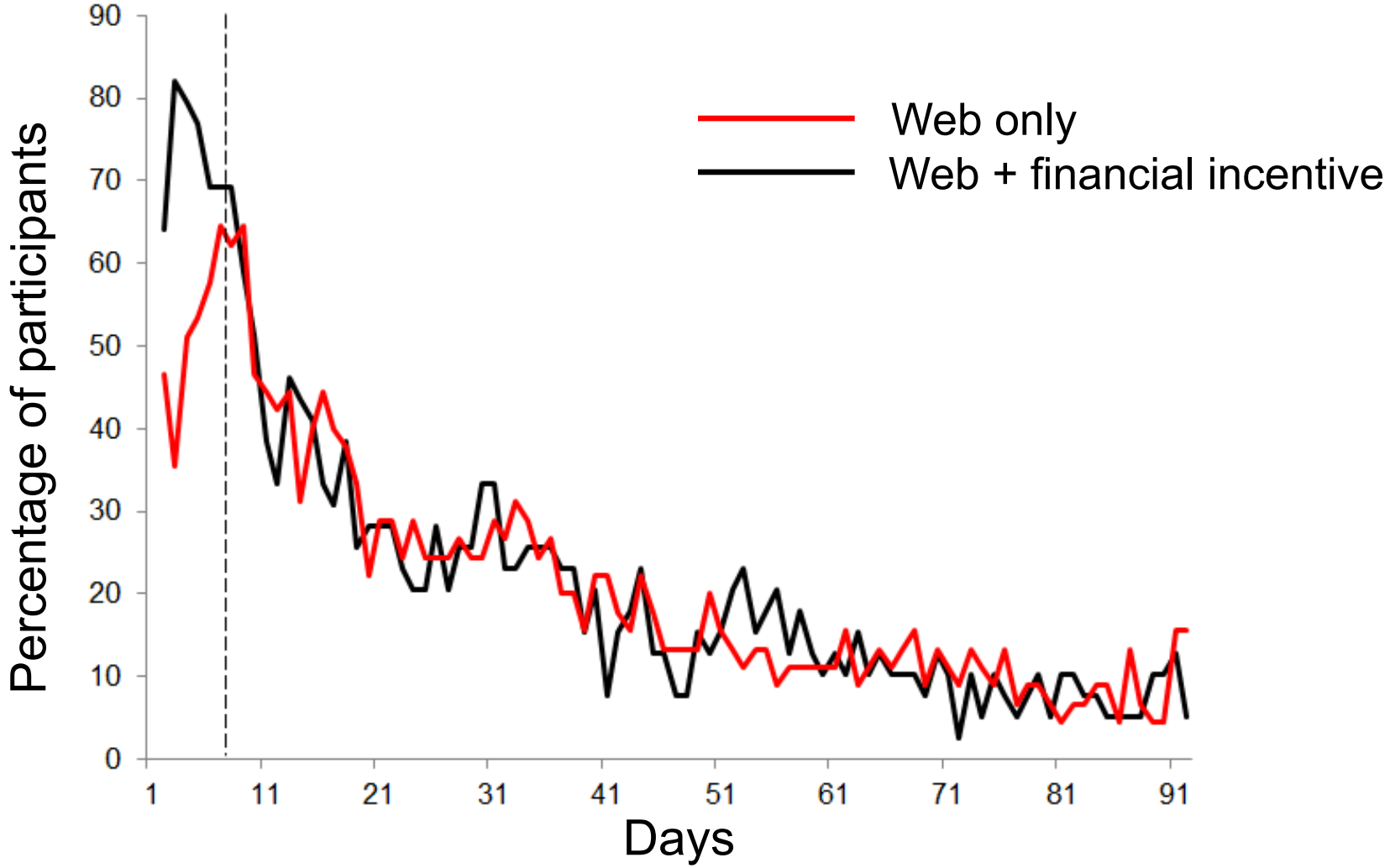
Kuna ST et al. Sleep 2015: 38;1229-36.

Mean (SD) hours of use per week over 3 months



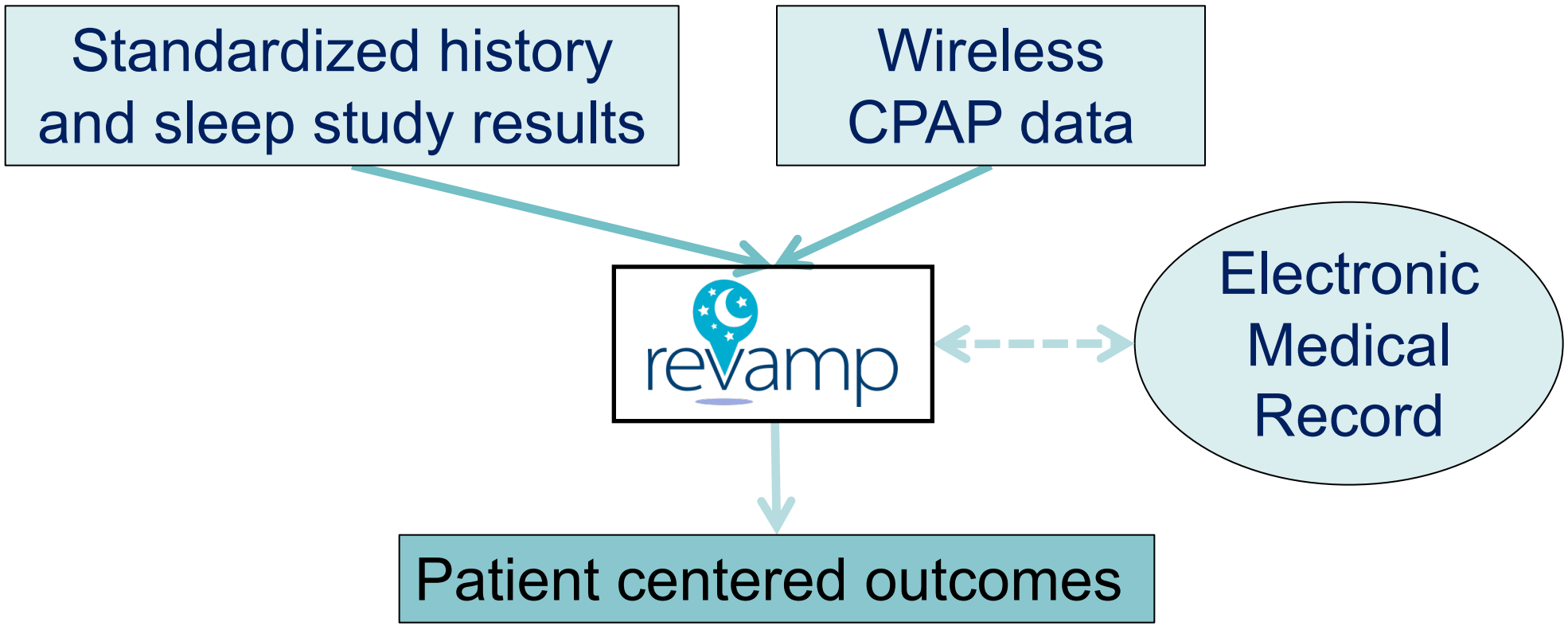
Kuna ST et al. Sleep 2015: 38;1229-36.

Percentage of participents accessing the website each day to view their CPAP data



Kuna ST et al. Sleep 2015: 38;1229-36.

Web-based platform to acquire information from the patient about symptoms and outcomes



Remote Veterans Apnea Management Platform (REVAMP)

Mobile.va.gov/app/
revamp-**clinicians**

Mobile.va.gov/app/
revamp-**veterans**

REVAMP is an interactive Veteran and provider-facing web-based application designed to facilitate the remote diagnosis and management of OSA

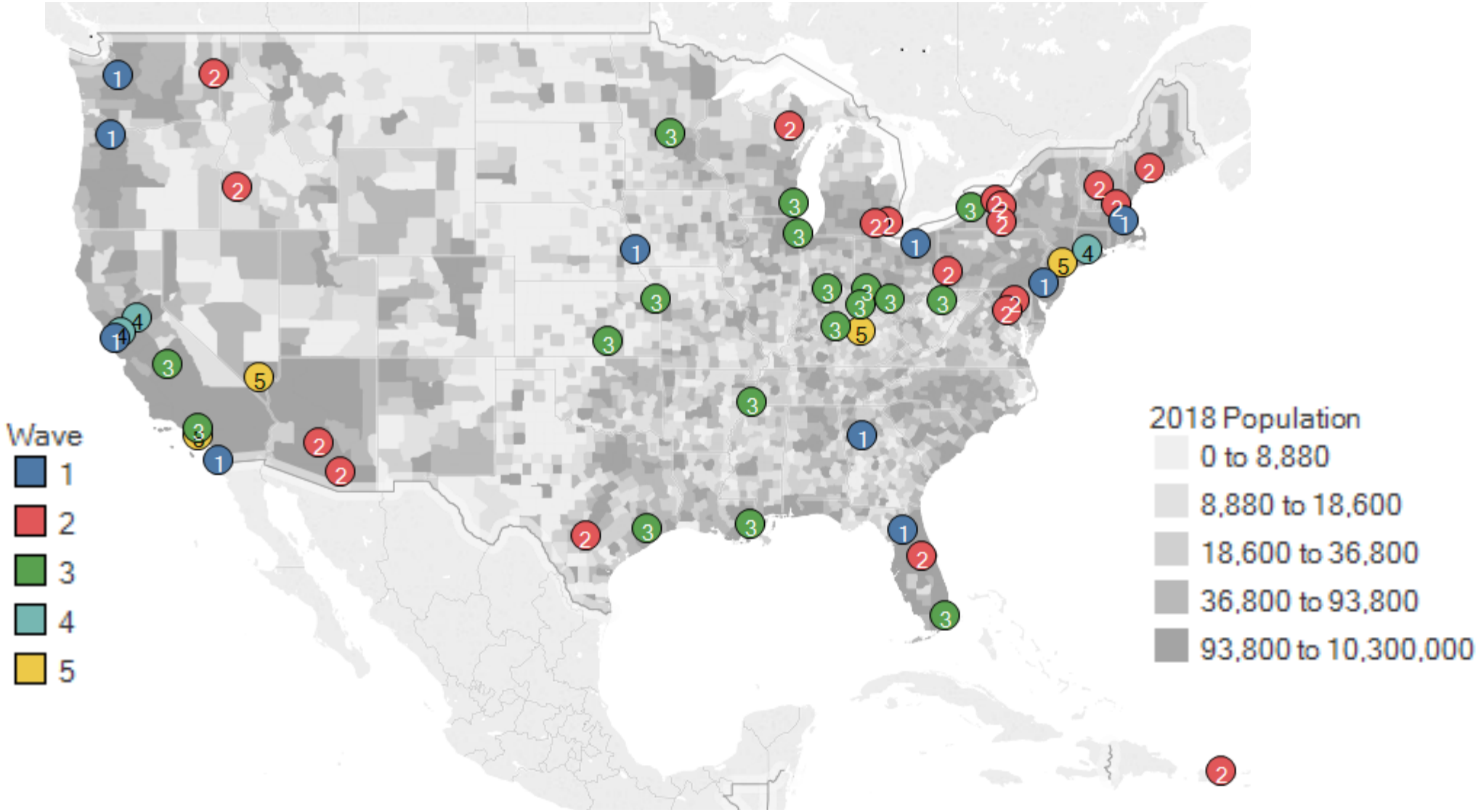
Veteran

- Complete questionnaires from home
- View PAP device data
- Access OSA education
- Secure messages to practitioner

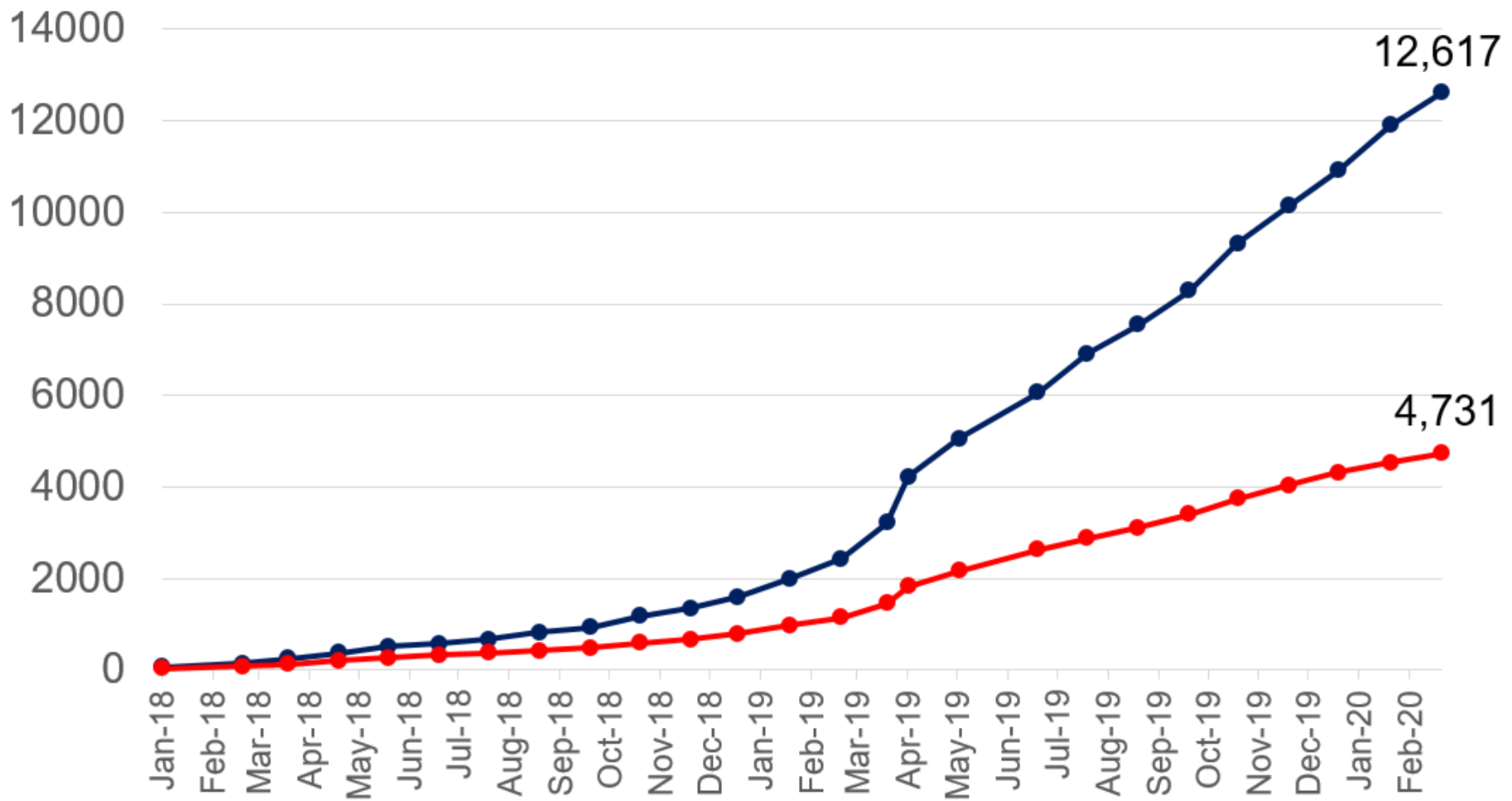
Practitioner

- Remotely collect and review questionnaires
- Generate templated progress notes
- One-stop shop for PAP data
- Develop reports

VA medical centers with REVAMP



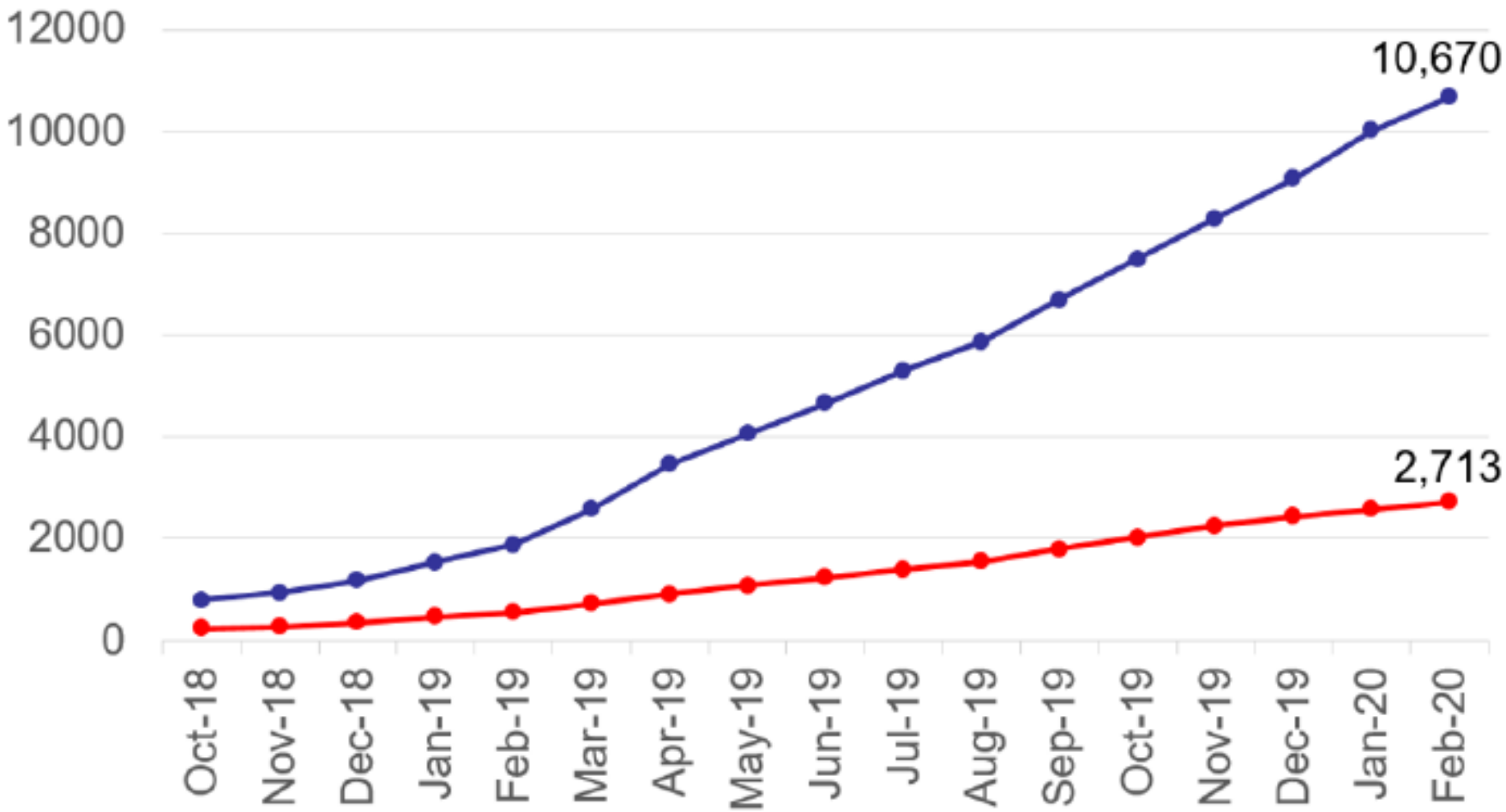
REVAMP metrics: Cumulative enrolled and logons



Accounts created

Veteran logs on (37%)

REVAMP metrics: Veterans viewing PAP results - cumulative



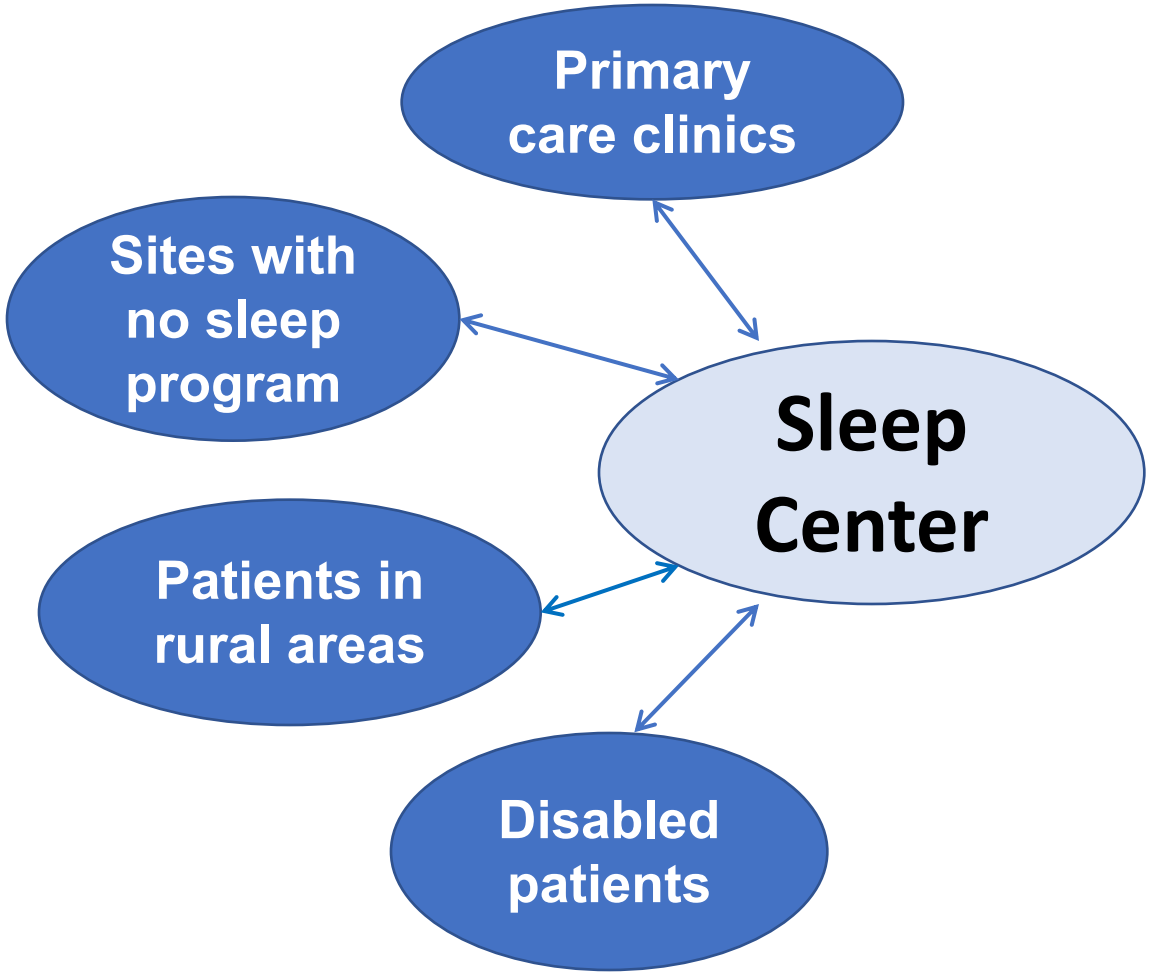
PAP data on REVAMP

Veteran viewed PAP results (25%)

Barriers to implementation and acceptance of REVAMP

- REVAMP housed within VA firewall to ensure patient privacy and security
  - Requires patients having a MyHealth*e*Vet premium account – restricting access
  - VA approval regulations delayed platform development
- Platform not connected to the VA electronic medical record
  - Requires double entry of results by clinicians
  - No workload credit for effort spent using REVAMP
- Funding challenges
- VA prefers to buy rather than make

The Office of Rural Health TeleSleep program: Expansion of the hub-spoke model

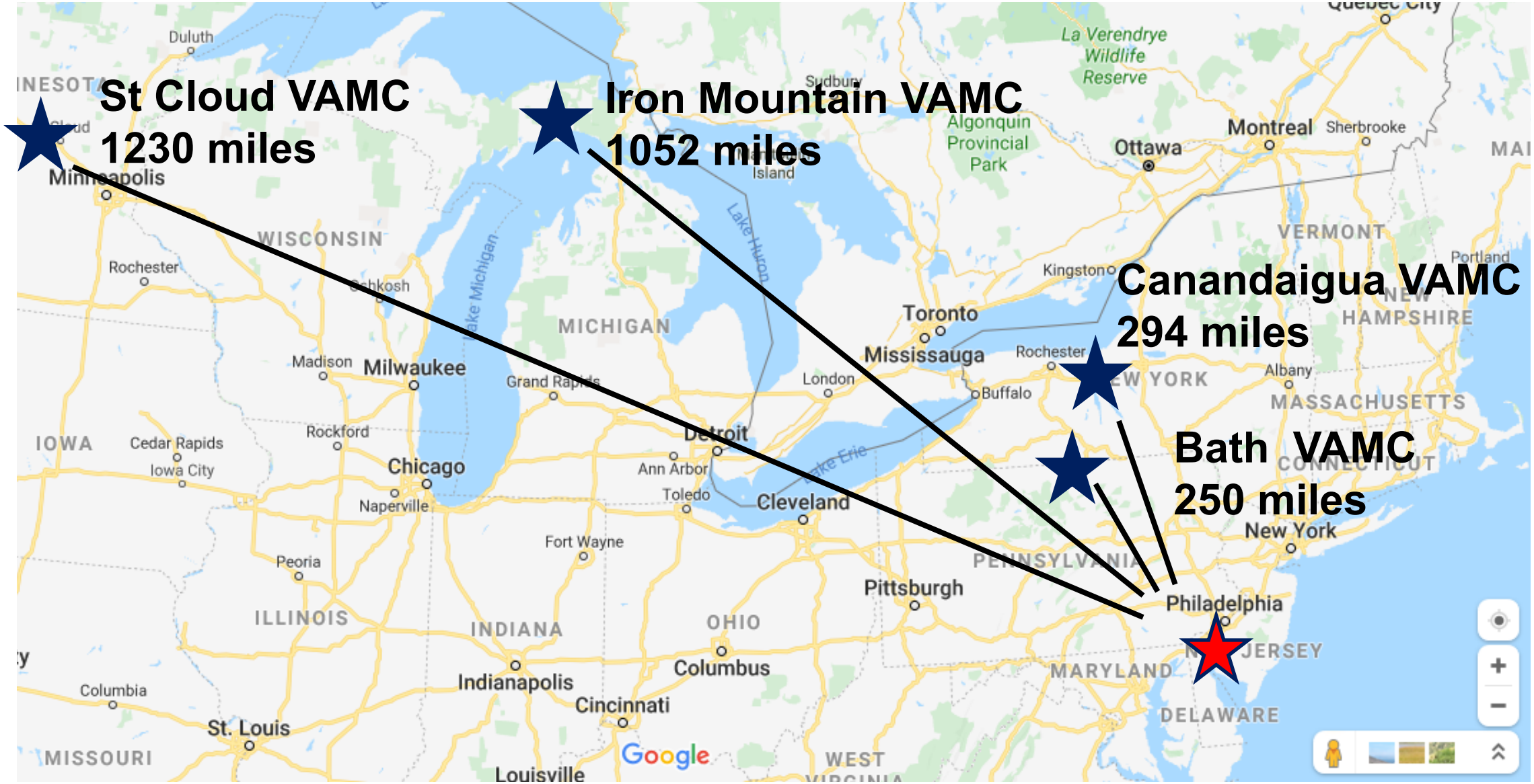


- Non-MD practitioners
- Video teleconference clinics
- Home sleep apnea testing
- AutoCPAP with wireless data
- Web-based platform management

The Office of Rural Health TeleSleep program for rural veterans with sleep disorders

Sarmiento KF et al. J Clin Sleep Med 2019;15(9):1355–1364.

Spoke sites of Philadelphia VAMC's TeleSleep program



The secret of change is to focus all of your energy, not on fighting the old, but on building the new (Socrates)

- Resume of in-person clinic visits – especially for initial evaluation and PAP set-up
- Retain telemedicine-based pathways for delivery of CBT-I and OSA management to increase access, continue telework, decrease cost
- Reliance on cloud-based platforms that are integrated with the electronic health record for sleep testing/scoring and collection of questionnaires and patient information
- Development of high-performance sleep disorder networks to deliver efficient, cost effective care
- Increased reliance on non-physician sleep specialists and primary care providers to deliver routine care to patients with OSA and chronic insomnia
- Likely development of new technologies that disrupt our clinical practice


AND, WHEN YOU CAN'T GO BACK, YOU HAVE TO
WORRY ONLY ABOUT THE BEST WAY OF MOVING
FORWARD.
- PAULO COELHO